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29 October 1984

West Europe Report

SCIENCE AND TECHNOLOGY

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WEST EUROPE REPORT

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CONTENTS

ADVANCED MATERIALS

BRIEFS

SOLID BATTERY IN FRANCE--Thanks to the discovery and study of new materials that allow the solid phase transport of lithium ions, researchers at ENSEEG's (Grenoble National School for Higher Studies in Electrochemistry and Electrometallurgy) Laboratory for Electrochemical Power Generation, together with many engineers from the school, are currently perfecting--in collaboration with interested French companies (SNEA--Societe Nationale Elf-Aquitaine, CGE, Wonder, Thomson, CSF)--new batteries in which electrodes and electrolytes are entirely solid. Their essential advantages are very high stored energy per unit mass (3-4 times that of lead batteries), excellent lifetime, and total absence of maintenance. Added to these is the possibility for some batteries to be manufactured by techniques similar to those used in microelectronics (thin films). Applications as varied as integrated storage on microelectronics circuits, or highly autonomous electric vehicles, are now possible. Several engineers who have graduated from ENSEEG in the past few years, are already working in industry to contribute to the fabrication of industrial prototypes. [Text] [Paris COMPOSITES ET NOUVEAUX MATERIAUX in French Jul-Aug 84 p 12] 11,023

NEW 'IMPREGNATED' COMPOSITE--Metals in general, and aluminum alloys in particular, are conventionally shaped by liquid phase pouring (casting) or solid phase deformation (forging). For the production of pistons, the Research Center of the AE Group has developed a casting process called Mega-Pression, which lies between solid phase forging, and casting under very high pressure. The principle of the process (called squeeze-casting by the Anglo-Saxons) makes it possible to combine the very good mechanical characteristics (fatigue resistance, notably) of forged micro-structures, free of void defects, with the process implementation economy of liquid phase transformations. In addition to the improved mechanical characteristics intrinsic to materials obtained with Mega-Pression casting, the research engineers of the AE Group have perfected and patented associated processes which make it possible to form local reinforcements for pistons cast by Mega-Pression, either with additional elements inserted during the casting (ring grooves, expansion compensation sleeves, soluble cores, and so on), and/or by ceramic or metal fibers impregnated by the liquid metal under the influence of the very high pressures that are used (of the order of 150 Mega-Pascals). By means of this impregnation, the latter technique results in composite materials whose mechanical characteristics are doubled at ambient temperature and quadrupled at 400 C. These new impregnated composite materials are used successfully used here to avoid fusion and fissuring at the edges of combustion chamber lips, and to thermally insulate piston bottoms (adiabatic engines). Impregnated composite materials obtained by Mega-Pression casting are also used to avoid ring groove wear in the new designs of lightened pistons. [Text] [Paris COMPOSITES ET NOUVEAUX MATERIAUX in French Jul-Aug 84 p 4] 11,023

CSO: 3698/622

AEROSPACE

ELA 2 ARIANE LAUNCHPAD IN KOUROU TO BE READY BY 1985

Paris AFP SCIENCES in French 9 Aug 84 pp 21-22

[Text] ELA 2 (Ariane Launching Assembly) will be ready sometime next summer at Kourou. This second launching zone, built expressly for the Ariane family, represents one more step toward the industrial use of space. Its design is based on a rapid and organized exploitation of the European launcher.

The construction of ELA 2 was decided in 1981 in terms of three essential functions:

Reduce the minimum time interval between two launches (the delay is currently two months with ELA 1, and should drop to one month with ELA 2);

Optimize exploitation costs;

Develop facilities for preparing the necessary payloads.

Unlike ELA 1, the former launchpad of the Europa rocket, remodeled for the specific needs of Ariane 1, 2, and 3, and which requires that the launcher be assembled at the firing location, ELA 2 consists of two zones:

The launch preparation site, which is an imposing building in which are assembled the stages of the various launchers, from Ariane 1 to 4, without nose cone;

A second zone which is the actual launchpad, at a distance of 950 meters from the launcher preparation building. This launch zone includes a fixed umbilical tower for connection to the launcher up to the last minute, notably at the level of the cryogenic arms of the third stage. The second unit, a service tower, provides access to all levels of the launcher as well as its ventilation. It is mobile so that it can be withdrawn several hours before launch.

The two zones are independent of each other. A launcher can thus be under assembly at the preparation zone, while another is being readied for firing on the launchpad. The launch rate can thus be twice as high as that of ELA 1, and a launch will be possible every month.

A double track between the two sites allows the launchers to be carried on their launching tables in a vertical position, from the assembly zone to the launchpad. The delicate load is drawn by a semitrailer tractor with a gear reduced clutch, so as to avoid any sudden movements.

A turntable is located midway along this track so as to allow the crossing of two launch tables or storage. Several table models will be used so that the stages of the various Arianes will be brought level with the same points of the assembly and launching towers.

11,023
CSO: 3698/622

AEROSPACE

ARIANESPACE GENERAL DIRECTOR ON SATELLITE LAUNCHER MARKET

Paris SCIENCES & AVENIR in French Sep 84 pp 48-51

[Interview with Arianespace General Director Charles Bigot, by Jacques Girardon: "The Rivals of Ariane are Mobilizing"]

[Text] Following the faultless launching of Ariane 3, which placed its satellites exactly as planned, Europe's competence in space no longer needs to be proven. The market captured by Arianespace is eliciting a reaction from the Americans, and is giving the Japanese ideas. But this time, Europe will not sleep on its laurels.

[Question] There is now a commercial company, the first of its kind, which executes and sells the placement of satellites in orbit using the Ariane rocket. Who are the major competitors of Arianespace?

[Answer] At first, Ariane ran into the competition of the only launcher to be really considered for this market, the Thor-Delta. But it very soon had to confront its true competitor, the space shuttle. The shuttle was very successful with its flights and received a large number of orders. But for the past year, since President Reagan's intervention on the commercialization of launches, the United States seems to have been working on reinstating conventional launchers on the market. We therefore expect to see the reappearance both of the Thor-Delta from TCI, and probably of the Atlas Centaur which is looking for a spot on the market.

[Question] But which has had some problems recently.

[Answer] Indeed. The orbiting of the Intelsat F9 satellite failed due a problem with the third stage, on which some improvements were made with respect to the former model. That might explain it. But Atlas Centaur has always been a good launcher. It has orbited a large number of Intelsat satellites. And Atlas Centaur is now conducting a campaign in the United States: it has signed contracts containing specific conditions with new telecommunications companies such as Rainbow, which shows that they are carrying out a very intensive marketing activity.

We thus believe that the American competition is the only one that we have to face for the time being, at least for the current decade. But after 1990-1992 we expect the Japanese competition, which in fact threatens to probably be rather difficult, because the Japanese have selected very good market slots and manufacture launchers which will meet users' needs. Despite the price they announce on the domestic market, which is rather high, we think the the Japanese will produce quality at a good price.

[Question] Engineering man-hour costs are one-half as high as those in the west.

[Answer] That's true, but there are still some oddities. You probably know that Europe has recently made an offer to Japan for the launching of a meteorological satellite. The Japanese have some problems with their meteorological satellites, and the Europeans had the ingenious idea of offering them the Meteostat satellite which is built in Europe and launched by Ariane. Well, I can tell you that the contract price was one-half what the Japanese will pay for the satellite and a Japanese launching. This only shows that Europe can provide excellent competition. So what does this mean? Do the Japanese have a domestic market price which is different from the foreign market price? In any case, if the Japanese were to compete at the price at which they currently sell their launchers on the domestic market, we would have no worries.

[Question] That is where it becomes important for Arianespace to gain customer loyalty, to the extent to which someone is accustomed to working with you and to which you offer an adapted launcher.

[Answer] Yes. Despite its limitations (which Ariane 5 will correct later), Ariane 4 is still much better than the Japanese H 1, and meets all known payload specifications until 1992-1995. Ariane 4 is adapted to launch two 2-ton payloads which correspond exactly to the satellites presently planned by the large American manufacturers, such as the Hughes 393, the RCA 4000-5000, the Ford satellites, and the European satellites built by Satcom in Europe or by Aerospatiale. For 1987 to 1992--and since families of this type last 8-10 years, maybe later, until 1995--the world's five large manufacturers foresee satellites of the order of two tons. And Ariane 4 is built exactly for that; we are fortunate that the diameter of 3.65 m, which is one of Ariane 4's limitations, is large enough to accept all these satellites. When we will have a tool such as Ariane 4, namely beginning in 1986, we will have the means to gain customer loyalty, as you say.

[Question] The Soviets know how to build rockets and how to launch them like buses, at an incredible rate. These launchers have proven themselves. But for political or economic reasons they are not found on the market. Is is likely that the Soviets might enter the commercial arena and sell their launchers? I am thinking for instance about some of the third-world countries which will eventually need satellites. India can ask the Soviets to place a large satellite in orbit.

[Answer] India has already done it, and will launch its observation satellites with Russian rockets. I believe they have an agreement. There is no reason for Russia not to launch satellites for companies which want to entrust these satellites to them. You have said it: the Russian launchers leave Earth like buses, and with high reliability. I see a limit to this kind of market penetration because users will not want to entrust their satellites to a Rusian launcher, for two reasons. One is the ban against the entry of American technology into Russia, which will remain a great barrier for some time. The Americans will never allow satellites manufactured by them to enter Soviet territory. When I say never, I mean for the time being. There are those which the customers manufacture themselves, and they are free to do what they want with them. That is India's case with the remote sensing satellite. But it was certainly out of the question to launch the Indian satellite Insat, manufactured by For using a Russian rocket. The second reason is also a technical one, but in the other direction. A customer cannot, except by trusting you completely and blindly, manufacture a satellite without knowing some of the launcher's characteristics, in particular trajectory accuracy, vibration, remote detection, remote control, and other specifications. Everything concerning the interface between satellite and launcher must be supplied by the launcher. We know this quite well, since we have to supply the information to our customers. It is not technology as such, but it still covers some of our launcher's characteristics that would allow the customers to build a compatible satellite. The Russians say: "We will say nothing about our launcher; either you entrust us with your satellite, at your risks and perils, or we do not launch it". This is one of the reasons which for some time to come, will prevent customers from using Russian launchers.

[Question] You often hear that when the shuttle or other Ariane competitor has problems, it provides another opportunity for the European launcher. However, it does not seem that simple.

[Answer] No, because the market is created every day. We are faced more with a need than a market; meaning that because the market is not yet well established, it reacts with great sensitivity to every event. There is the matter of launcher and satellite insurance, the least failure of which is now considered a catastrophe. Which is normal, considering that the insurers, who have so far played their cards--almost literally--maybe without too much analysis for lack of data, are finding that they have set incredibly low rates, for the space shuttle as one example, and that they are faced with enormous failures that must be settled. Now they don't know what else to do but double or triple their premiums, thus completely disorganizing the market. And that is bad for everybody, including Ariane of course.

Moreover, the credibility, trust of customers in everything that has to do with space is necessarily somewhat affected when the organization with the greatest competence, the most money, and which is the most famous--NASA--shows that it too can ultimately experience stinging failures. In less than one year they have after all accumulated four terrible accidents: TDRS last year, Palapa and Westar 6 in February, and lastly, the Intelsat F9 launching by Atlas Centaur. Some customers can then begin to think that the space business

is not that safe after all. Will this discourage them? I don't believe so. But it can make them think and force them to provide greater guarantees to those who lend them money. Once again, this disorganizes all the insurance or financing support for new companies which want to start up.

[Question] It affects the overall confidence in space.

[Answer] Or at least it creates a question mark. I don't think that confidence is really affected, but the price we will have to pay for insurance is no longer as clear, and people want to maintain a margin of safety. Actually, you could even speak of a confidence loss in the case of certain insurers, some of which have withdrawn. You have new companies which for instance are trying to start up, which need money, and which thus need to borrow. Financial companies will lend them money only against insurance contracts because they do not want to run the risk of not being repaid. But the insurance companies no longer want to insure. It is good neither for Ariane nor for the space community as a whole.

And then you have a second effect: the shuttle cannot meet its commercial obligations. Its customers are unhappy and some of them come to Arianespace. But Arianespace cannot satisfy them because it cannot postpone the launches of its own customers. There is thus a latent discontent among users, first toward the shuttle, which is delaying its launches, but also toward Arianespace, in which they are disappointed for not finding the help they seek. Some customers ask us to launch within six months; we cannot because we have our own customers.

[Question] Hence the interest to build the ELA 2 launchpad at Kourou, followed soon by ELA 3.

[Answer] Indeed. This justifies all the flexibility resources which we can achieve. Launching flexibility to begin with. You mentioned that we will be able to launch more rapidly and more often with the second launchpad. But it will also serve as spare in case of accident with the first; the third, which is next, will serve as spare for the second, and so on. But even with launchpads which allow high launching flexibility, we still have to have a high production flexibility. Yet, who can afford to stock launchers at 500 million each, with money at 13 percent per month, simply waiting for a shuttle failure so that he can bring out launchers one after another? That's not possible either.

On the other hand, there is a third effect of failures, which is somewhat more positive for us: it shows that companies which have many satellites to launch must provide for emergency facilities. And that is one thing we have been saying to our customers for a long time: "Don't put all your eggs in one basket." Those, which like Intelsat, were sufficiently wise to buy launchers at both supply sources, find that when one of them is in trouble, they can ask the other to hasten a scheduled firing; there is always some flexibility. Customers are beginning to learn this, which works to our advantage, because

we believe that companies will think, and increasingly tend to consider it normal to have the two sources that I mentioned. We claim that Ariane is now the only believable dependable, and independent second source. People have become aware of it.

[Question] How do you perceive the evolution of the market? Will it develop spectacularly?

[Answer] As an overall comment, the launch services market is indeed very promising; like all single product companies, we pay great attention to the evolution of this market. We conduct the most serious studies every year to be sure that we do not misread its development, and the last study that we completed a few weeks ago shows that this market, although a little less optimistic than one or two years ago, is still very beautiful. I think that for seven to ten years there will be about 35-40 satellites to be launched per year, and that out of these 35-40 satellites Ariane should easily take about one-third, say 12 satellites per year, both in single and double launchings. This represents about eight Ariane 4 launchings per year. We are clearly beyond our starting forecasts. That is why the manufacturers which produce Ariane must develop their production facilities. Ariane was not intended for such a rate; it's a market in which Arianespace must also spectacularly develop its commercial activities, because the closing of 12 satellite launching contracts per year is not within anyone's reach. You can see that even limiting our objective to 30 percent, the market promises us a very large development that leads to a turnover of 4 billion francs for the company between 1987 and 1988.

[Question] What is happening with TCI's lawsuit against the Europeans for dumping?

[Answer] TCI (Transpace Carriers Incorporated) has lodged a complaint against practices whereby, in its words, the countries of Europe and the agencies of these countries, namely ESA (European Space Agency) and CNES (National Space Studies Center), are subventioning Arianespace so that Arianespace can export, notably to the United States, at lower prices than it sells in Europe. This company condemns this practice and naturally is asking the United States government to take the necessary steps. We find it interesting to hear, for the first time in any case, a very clear statement of the subventioning problem, and the first in line of fire, the one which is being subventioned to the utmost is obviously the space shuttle. So much so in fact, that one wonders whether by asking the question, TCI did not intend to attack through a third party, the space shuttle, which bothers them at least as much as we do, since you know that TCI, which sells Thor-Deltas is clearly bothered by the low prices of the space shuttle. I am of course letting the European governments, ESA, and CNES, which are under attack, respond as they must. I will point out that the operation has moved to the political plane with the agreement of the United States and the European governments. Generally, this type of request results in conversations between the attacked countries and the United States government. Very often, the matter is closed through negotiations that end up in an agreement. And we hope that this TCI request

will lead to such an agreement. Why am I interested in this matter? It is because such an agreement cannot avoid treating the problem of the shuttle subvention. And while it is true that Arianespace did receive some subvention at the start (which is no longer the case) through the double policy on prices, which was known by everyone, we did clearly advertise the fact. The double policy on prices consisted of having the European countries pay 25 percent more than the price of the American competitor in order to support Arianespace at the start. The member countries wanted to sell on the export market and begin commercial activities. So, while it is true that there was a subvention which has now ceased, it is even truer that an even larger one is given to the shuttle. I will cite two figures, and you will see how considerable it is: today, a shuttle flight costs 300 to 350 million dollars, and the revenue from its customers is of the order of 40 million dollars. That's a fantastically large subvention. We have not even tried to see where it comes from. It is so huge, that even if we are in error by a factor of two, it still remains a fantastic subvention. I know very well that in the future, this subvention will undoubtedly drop, because when they reach 24 launches per year (which is not tomorrow, given some of the difficulties they are encountering), the figures announced by NASA still signify a launching cost of the order of 175 million dollars. The currently announced price policy is satisfied to ask for 71 million dollars from customers when the flight is full. But you know that the shuttle sometimes leaves half full, with two payloads instead of four. I am therefore very interested to see how the negotiations will end, because they will have to discuss the matter of subventions.

11,023
CSO: 3698/10

BRIEFS

BRITISH 'SUPER-SHUTTLE'--On Friday evening, 24 August, British Aerospace, the nationalized aerospace manufacturer, confirmed that a space shuttle of new design is indeed being studied, and that a model of the craft will be displayed to the public during the annual Farnborough Air Show. The British television network ITN had announced on Thursday 25 August [as published] that secret plans were being prepared for the construction of a reusable horizontal takeoff super-shuttle, which could breathe atmospheric oxygen to supply its propulsion system. On Friday evening, retracting a first denial according to which the project existed merely as "scribbles on the back of an envelope," a British Aerospace spokesperson declared that it was in fact a "very serious study." The super-shuttle, called HOTOL (horizontal takeoff and landing), would be placed in orbit as a platform for satellite launching. The spokesperson further indicated that with a certain resemblance to the Concorde, it would be pilotless, remote controlled, and would allow frequent operations at short time intervals. [Text] [Paris AFP SCIENCES in French 30 Aug 84 p 26] 11,023

CSO: 3698/622

AUTOMOBILE INDUSTRY

FRENCH GROUP DEVELOPS LONGER-LIFE NICKEL-ZINC BATTERY

Paris L'USINE NOUVELLE in French 6 Sep 84 p 7

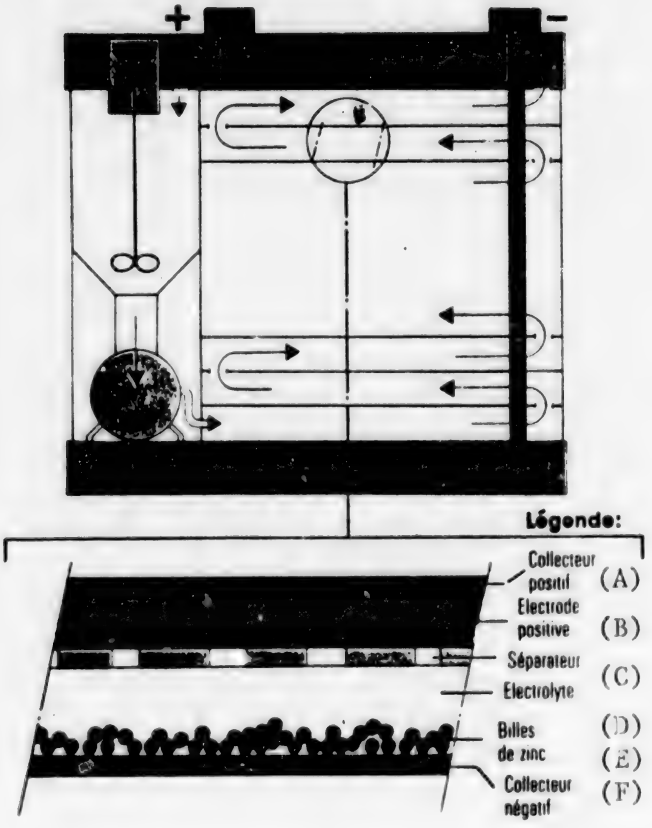
[Text] While its energy density is very good, nickel-zinc (Ni-Zn) batteries have never been on the market because of their very poor lifetimes (number of cycles). During charging, the zinc deposit that is formed is very rough, with a proliferation of dendrites which cause short-circuits.

On the battery developed by Seregie, an economic interest group composed of Renault, AFME (French Energy Management Agency), EdF (Electricite de France), and Sorapec, this problem appears to have been solved: the zinc electrode is dispersed and composed of 0.3-mm plastic balls coated with a thin metal deposit supporting the zinc. At rest, these settle on the horizontal collector and receive the major portion of the zinc deposit during charging. To prevent them from fusing together or give rise to dendrites, they are intermittently placed in motion.

This is achieved by pumping in series the different elementary cells that are superimposed and connected in zigzag fashion.

The generator's architecture is characterized by stacked bipolar elements, which are separated by collectors. The latter are thin metal plates placed horizontally, and serve a bipolar function: their lower face is connected to the positive nickel electrode, while the zinc balls which form the positive electrode settle on their upper surface.

Based on the results obtained with a prototype assembly of nine elements, Seregie expects to obtain a mass energy of 70 Wh/kg from a battery which measures 28 x 31 x 59 cm. Its nominal capacity will be 110 Ah at 45 V, and its lifetime longer than 1000 cycles.



Key: (A) Positive collector
(B) Positive electrode
(C) Separator
(D) Electrolyte
(E) Zinc balls
(F) Negative collector

A kilowatt-hour obtained with this battery will cost 600 francs. By comparison, the same power from a lead battery costs 450 francs, and that from a Ni-Fe battery 1000 francs, with mass energies of 36 and 60 Wh/kg, respectively. Seregie will be able to continue its tests in the laboratory and by the end of 1985 expects to use the battery in a new generation Renault 5 equipped with an electric motor.

11,023
CSO: 3698/622

BULL OF FRANCE EXPLAINS WORK WITH SUPERCOMPUTERS

Paris LES ECHOS in French 2 Jul 84 p 7

[For related article see WST-84-031 of this series dated 11 Sep 84 pp 25-32.]

[Text] Following the section dedicated to supercomputers in the 20 June supplement to LES ECHOS INDUSTRIE, Jacques Stern, president and general manager of Bull, wrote to us to challenge certain opinions which he felt could be prejudicial to his business.

"Alluding to the development of the Isis supercomputer entrusted to Bull by the defense ministry, your collaborators judged it 'equivalent to present generation hardware...about 5 times less powerful than its American competitor which will have come out 2 years earlier and 25 times less powerfulthan the computers expected in 1987.'"

"In fact, it seems reasonable to evaluate Isis as between 4 and 6 times as powerful as the Cray 1, or the size of the Cray 2 when its performance is officially announced. By any estimate, the Cray 2 or its equivalent would not be, at a maximum, more than 2 times faster than Isis. Finally, Isis will be in the power range of NEC's [Nippon Electric Company] SX2 and ought to appear at the same time."

"I would like to remind you that performance and specifications are defined in cooperation with future users to be sure that they correspond well to the needs of French research."

"In another article of this supplement, Bull was criticized for its investment in 'the American firm Trilogy to acquire rights to "wafers," new very high integration components. A laudable initiative, but a very poor choice; unable to obtain the anticipated results, the American company has just abandoned its project.'"

"Well, while Trilogy has in fact decided to abandon its project to manufacture a very large computer, which was not taken into account in the technical agreement between Bull and Trilogy, that company simultaneously announced its intention to continue development of its 'wafer scale integration' technology (which interests not only Bull but DEC and Sperry-Univac)."

"Regarding this same investment, the author of the article criticizes 'Bull's troublesome tendency to disperse its efforts.' He shows his total misunderstanding of the fact that access to rapidly evolving component technologies is one of the key elements of the competitiveness of a computer manufacturer."

"'As if this lesson were not enough, Bull has recently signed an agreement with the Japanese firm NEC to import and retail supercomputers better adapted to its product line,' is stated further on. Thus, the completion of this agreement (which has not yet been signed), 'would lead us to failure' and 'a dispersion of our efforts.'"

"Now, this agreement has as its object to offer to our customers in the large and very large system DPS8 and DPS88 sector a way to evolve towards superior speeds which are indispensable to them to insure the development of their applications. If we did not do it, we would be accused of lack of foresight and inconsistency."

12666
CSO: 3698/11

FRENCH SCIENTISTS MAKE USE OF CRAY 1 SUPERCOMPUTER IN SACLAY

Paris SCIENCES & AVENIR in French Sep 84 p 14

[Text] The Vectorial Computing Center (C2VR) is finally at home. One year after the start up of a temporary service at Saclay, it has been installed in its permanent site at the Ecole Polytechnique at Paliseau. Its official dedication by Robert Chabbal, president of the scientific and technical commission of the ministry of research and technology, took place 5 July.

"The French scientific community now has, permanently, the most efficient heavy duty scientific computing tool," Andre Berroir, president of the administration of the C2VR economic interest group, emphasized. Until that time, scientists had had to go abroad to do their heavy calculations and to have access to Cray 1 supercomputers. Now, they have the opportunity--and they are making full use of it--to do this in France.

The C2VR is equipped with a powerful vectorial computer, the Cray 1, linked to an IBM 4341 for file administration. A "Hyperchannel" network permits several computers to access the Cray directly, to input jobs, to recover results, to transfer files or to obtain information on the status of jobs.

The need to have a high powered computing center available is such that in 1 year about 500 scientists have expressed the desire to be allowed to use the services of the C2VR for the study of some 250 research projects. At this rate, saturation of the center is foreseeable by some time in 1985....

Among the first and largest users is the national weather service which hopes to improve its overall operation of numerical weather forecasting and the National Office of Aerospace Study and Research (ONERA) which has studied, by means of Airbus plane modeling, air flow around the fuselage and wings of airplanes, etc....

Astrophysists have already used the C2VR for the numerical simulation of spiral galaxies; biologists for the precise determination of the atomic coordinates of a polypeptide chain of the flu virus; chemists for the numerical simulation of a catalytic reaction; mathematicians to find the largest prime number to date...

The C2VR is an economic interest group formed by 8 partners (the National Center for Scientific Research, INRIA [expansion unknown], General Armament Management, ONERA, the research administration of the ministry of national education, etc...

More than 65 Cray 1's are presently installed worldwide, including 25 in Europe and 8 in France. But already a new even more powerful hypercomputer, the X-MP/48, has just been introduced by the American firm Cray Research, Inc.

12666
CSO: 3698/11

BRIEFS

FRANKFURT CYBER 205 SUPERCOMPUTER--Frankfurt. Control Data GmbH will restructure its worldwide CYBERNET computer network. Accordingly, the CYBER 205 (capable of 800 million operations per second) installed at the University will carry the main load of the German network. The previous main-frame computer in Frankfurt, a CYBER 175, could no longer handle the load. It will be replaced by a CYBER 176 with twice the speed located in Brussels. With CYBERNET, Control Data offers mainly complex technical-scientific software and consulting services. With the expansion of the vector processing service, the more than 400 German users will be in a position to simulate by means of a computer model complex experiments such as wind tunnel tests and crash analyses with greater speed and economy, obviating in many cases time consuming and costly tests on hardware models. [Text] [Leinfelden-Echterdingen DIE COMPUTER ZEITUNG in German 8 Aug 84 p 1] 9160

CSO: 3698/621

JAPANESE TO BECOME MAJOR PARTNER IN FRENCH MACHINE-TOOL FIRM

Paris L'USINE NOUVELLE in French 27 Sep 84 pp 29-30

[Article by Patrick Piernaz: "Ernault-Somua: The Japanese Temptation"]

> [Text] Toyoda could acquire a majority interest in the HES [expansion unknown] subsidiary, and maybe a minority interest in Ernault-Somua. An admission of failure for the European industry... but a solution that will save the former French leader.

After three years of uncertainty, is Ernault-Somua finally about to get off again to a good start? Its case, which until now was in the hands of the DIMME [Directorate of Metallurgical, Mechanical and Electrical Industries], the Ministry of Finance and the Ministry of Employment, was just transferred to the CIRI (Interministerial Committee on Industrial Restructuring). At the headquarters of the leading French manufacturer of numerical control lathes, in Velizy, this decision was judged positive.

Last year, the company lost its dynamic chief executive officer, Jean-Claude Albrecht, who got tired of waiting for the solution promised by the machine-tool plan.

For three years, the company hoped to join the Intelautomatisme group (consisting of Hure and Graffenstaden) piloted by the Suez group. In vain; until now, the chief executive officer of the large nationalized bank, Jean Peyrelevade, did not show any great eagerness to take control of Ernault-Somua. For two major reasons: the company's very bad financial position, and the existence of HES-Toyoda, the Ernault-Somua subsidiary in Montzeron (Cote-d'Or), which manufactures machining centers under a Japanese license, some of which are competing with machines produced by Intelautomatisme. As for Toyoda, it consistently refused to disinvest itself of its French facility.

Its persistence finally paid of, since the authorities are now thinking of allowing Toyoda to acquire a majority interest in this subsidiary; until now, the Japanese company owned only 35 percent of the subsidiary's stock. In a second stage, Toyoda could even acquire a minority interest in Ernault-Somua, jointly with other industrial groups.

Today, the CIRI can either merge Ernault-Somua with Intelautomatisme, as planned, or call on all large French manufacturers, as was done in the case of Heavy French Machines (MFL), whose clients (Alsthom, Usinor, Dassault, Peugeot, etc.) have now become its stockholders. SOPARI [expansion unknown], a subsidiary of the IDI [Industrial Development Institute], would then become the majority stockholder.

All the same: abandoning the HES-Toyoda subsidiary to the Japanese manufacturer is essentially an admission of failure for European manufacturers, who were unable to unite and prevent the importation of highly competitive Japanese equipment. And the installation of Yamazaki in Worcester, with British subsidies, followed by the strengthening of Toyoda's position in France, with the blessing of the French state, are now precluding any protectionist measures that would have enabled the Europeans to get their second wind. At home, Graffenstaden, which is in the midst of restructuring, will have to count with a French competitor.

It is true that we cannot systematically refuse to consider any Japanese financial effort to get established in France, and at the same time regret that they always choose other European countries for their investments. Especially when they are offering serious financial contributions.

For 1983, the Ernault-Somua balance sheet reveals considerable losses: FF 239 million for sales of FF 243 million. The company is holding out only thanks to the continued support of the authorities. In addition to being discharged of its debts to the state, Ernault-Somua needs FF 300 million to recover a good financial position. On the other hand, the former French leader is far from being an empty shell. In addition to a remarkable catalog, it has a backlog of orders that was replenished after the Machine-Tool Biennial Show and, six months later, is larger than for the whole of 1983.

Ernault-Somua cannot disappear. Submerged by the invasion of Japanese equipment, is it about to be saved from drowning by a Japanese company?

9294
CSO: 3698/21

JAPANESE MACHINE TOOL FIRM BUILDS PLANT IN UK

Paris L'USINE NOUVELLE in French 30 Aug 84 p 14

[Article by Patrick Piernaz: "Machine Tool: Yamazaki Gains a Foothold in Great Britain"]

> [Text] An ultramodern 10,000 square meter factory, a future production of 60 machines per month... By establishing itself in Great Britain, the principal Japanese manufacturer of numerically controlled machine tools is doubtless going to shake up the European market.

Beginning in 1986, every month 60 numerically controlled machine tools will come out of the ultramodern factory that Yamazaki is going to build near Worcester in Great Britain.

The arrival of the Japanese manufacturer will not fail to shake up the European machine tool chess board. First, because the planned monthly production volume--30 numerically controlled lathes and 30 tooling centers (standard machines from the catalog)--is greater than most European factory outputs, then also because the quality and variety of machines result from an excellent accommodation of product to client--so the Japanese manufacturer will have no difficulty selling his products. It cannot be ignored that Yamazaki already sells nearly 20 percent of its worldwide production (4000 machines per year) in Europe.

This danger did not escape the notice of the Germans, who tried in vain to block the Yamazaki application in Brussels and to block British aid to the Japanese project. Mrs Thatcher's country was able to be generous in winning the decision in competition with Belgium, the Netherlands and the FRG. In fact, the British government granted a subsidy of 5.2 million pounds out of a total investment of 30 million pounds (Fr 340 million). "A subsidy which covers only the cost of the flexible production workshop, and which is offered from the assets of the "F M Scheme-grant" to all English businesses which set up a flexible workplace," clarifies Les Pratt, acting general manager of Yamazaki at Worcester.

The workshop under construction will be quite automated. It will include 36 numerically controlled machine tools and 30 robots, all being served by wire guided trucks. "This factory, the most modern we have constructed, will take advantage of our experience with flexible shops that we have placed in service in Japan and in our American factory in Kentucky," affirms without false modesty Terukiko Yamazaki, president of the Nagoya firm, a strong family business in the front rank of Japanese machine tool manufacturers, with an annual revenue of $450 million with an export rate in the neighborhood of 70 percent.

From now on, with his European plant, Yamazaki is going to find himself very near his customers. This is a clear advantage for entering the robotization market where problems cannot be solved from a distance. And above all, the Worcester factory nullifies all plans to block Japanese importation into the EEC. Since they were not able to reach an agreement in time, the French, German and Italian manufacturers will have increasing difficulty competing with the Japanese manufacturers of lathes and tooling centers.

There is still some hope for Num Company, the French manufacturer of numerical controllers: outfitting the Yamazaki machines thanks to its local associate, the General Electric Comapny. This will not be easy; the Japanese manufacturer outfits his machines with his own Mazatrol controls, but he does not rule out also using Fanuc or General Electric products. "It is the client who decides. We are prepared to install different materials, provided they perform well," declares Les Pratt without ambiguity.

12666
CSO: 3698/11

SCIAKY OF FRANCE DEVELOPS SOFTWARE, NC DEVICES FOR WELDING

Paris INDUSTRIES ET TECHNIQUES in French 1 Sep 84 pp 27-29

[Article by Genevieve Hermann: "Welding: Power and Precision"]

> [Text] Electron-beam power welding also requires precision. At Sciaky, even 100-kW guns are guided to within 0.01 mm by microprocessors.

Resistance, electron-beam, inertia, gas-arc fusion welding... when it comes to welding, Sciaky can do it all. For a very good reason: the company, which at first specialized in aeronautics, used welding as a springboard to invade the automobile, naval and nuclear industries. Its secret: never leave anything to chance. To improve its control over welding problems, it is designing not only the machines proper, but process command and control systems as well. As a result, it is devoting 2 percent of its revenues to research and development. So that 40 of the 1,000 people employed at Vitry-sur-Seine are working in labs. Thanks to them, the company has, among other things, acquired a predominant position on the electron-beam welding market.

For each welding process, there is a lab and an independent team. These experts are researching all the theoretical and basic facets of welding phenomena. And when they have developed prototype equipment, they also get involved in the very practical determination of optimum adjustments.

A metallurgical laboratory supervises the various research, draws the conclusions and prepares the welding recommendations required to assemble certain materials under the best possible conditions...

An electronics laboratory develops command and control systems using mini and micro-computers.

In its electron-beam welding lab, Sciaky is now working to make more powerful guns. It is developing very-high-power machines (100 kW and over) that can weld 150-mm thick steelsheets in a single pass. These guns will be used in welding chambers with volumes of several hundreds of cubic meters, for heavy sheetmetal work. It was also Sciaky which recently built for the Japanese the largest machine in the world, to weld nuclear reactor vessels. A 45-kW mobile electron gun is equipping the vacuum chamber which has a volume of 265 m^3. And the lab is working on another, still more ambitious project for a French manufacturer.

High-Power Machines (100 kW and Over) For Heavy Sheetmetal Work

The machine owes as much to knowhow of the welding process as to the gun-movement mechanism. Indeed, it would be no use to have a precise and stable arc-current generator with a flimsy mounting assembly. Two years ago, for its own needs, the lab designed a 6-m^3 welding machine with a 30-kW gun. The electronics lab developed the command and control software that checks the welding position through microprocessors. The machine, which has a precision of one hundredth on all gun movements, was used to adjust the welding of the Ariane rocket gears, which had especially close tolerances. It is also used for a series of tests on materials such as light manganese alloys, copper or highly-oxidized steel, all materials which are known to be hard to weld as they create a flash hazard in the gun.

Thus, the lab is developing high voltage power supplies with very low ripple factors (less than 1 percent) to improve the flash-resistance of the guns. An electronic lamp mounted in series between the negative pole and the gun will control the discharge and regulate the welding parameters within one millisecond. The system detects the discharge and controls its development so that the time elapsing between the discharge initiation and the return of welding parameters to their original values is too short for the heat-source interruption to affect the fusion bath.

But the contribution of the electronics lab is not restricted to designing command and control systems for welding machines. Programs are calculating special electrode configurations in order to develop guns specially designed for certain electron-beam assembly problems. Thus, Sciaky is now studying a 10-kW small-diameter radial-firing orbital gun for the inner welding of tubes on plates or clamps on shrouds.

The electronics experts' knowhow is also used for other welding processes. All labs are researching welding quality control. Heat, pressure, temperature and feed sensors are measuring these various parameters during friction welding when manufacturing car wheels. A microprocessor check automatically provides the corresponding histograms. The lab is equipped with three friction-welding test machines of 50, 25 and 12 tons respectively, connected to a computer. They are making preliminary series of the new wheels that will make it possible to increase car loads and improve car braking conditions.

Multiposition Carts

A microprocessor-based control system for resistance-welding machines is also under development. It will deliver any type of welding cycle, will store parameter arrays in memory and, above all, it will provide quality control during operation through measurements of the dynamic resistance variations. The 10 engineers of the resistance-welding lab are also working on robotics. Their knowledge of electronics and programming has enabled them to develop multiposition motor carts. Non-slave and easy-to-program linear and rotating modules equipped with resistance-welding components are replacing multiple-electrode fixed equipment for several applications. This system, which received subsidies from ANVAR [National Agency for the Implementation of Research] is already used to weld the front panels of truck cabins and saw-blade mounts.

Considerable efforts are being made in the field of narrow-gap welding. With this method, it is possible to weld structures made of sheetmetal over 100 mm thick, in all positions, and in a fully automated manner, using gas-arc welding. Sciaky is developing transistorized generators for tungsten inert-gas welding, that have a stability of less than 1 percent and will modulate the welding current from 0 to 100 percent at 10 kHz.

A New Lab For Laser Welding and Complete-Systems Implementation

The company is contemplating setting up an additional lab for laser welding. It would be equipped with a laser having a power output ranging from 5 to 10 kW, and would research new applications as well as equipment technology. Sciaky is not planning to manufacture sources. On the other hand, it is proposing to manufacture complete systems. Recently, a 2.5-kW system was shipped to automobile manufacturers in Great-Britain. This equipment is used as a standard to determine precisely the optimum parameters of a given aplication. In addition, intentional and controlled disturbances of the various operating parameters are programmed so as to determine their incidence on the ultimate quality of the parts.

Sciaky

The Sciaky production line is extremely varied and covers all welding methods, complementary equipment such as electronic command and control systems as well as controllers, robotics and the development of related software. A member of the French Industrial Robotics Association, the company, whose stock is entirely in French hands, has developed all the components used in the equipment it manufactures, so as to have full control over its performance, irrespective of how it is laid out. Its plant in Vitry-sur-Seine covers an area of 25,250 m^2. It employs 1,030 people, including 100 engineers, 460 office workers and cadres, and 470 blue-collar workers. Its 1983 sales amounted to FF 444 million, including 60.9 percent of export sales. Specializing in the automotive, aeronautics and naval sectors, it tried to establish itself abroad. Apparently, it succeeded; it now has three subsidiaries in the FRG, Sweden and Spain, three sister companies in the United States, Great-Britain and Switzerland, and seven licensees throughout the world.

9294
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DFVLR RESEARCH IN ALUMINUM-LITHIUM ALLOYS

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German
16 Aug 84 p 1

[Article: "Unending Quest for Lighter Materials for Aircraft Construction]

[Excerpts] Frankfurt. The youthful metal aluminum is receiving competition from modern composite materials such as graphite-fiber reinforced plastics whose specific strengths (strength per unit of weight) can be higher than modern high-strength aluminum alloys. Of course, the strength of composite materials is strongly directional, but material applications frequently do not require strength isotropy. Thus, with such composite materials, designers can undercut the already low specific weight--2.8 grams per cubic centimeter--of modern high-strength aluminum alloys and lower the weight of aircraft structures. This translates into fuel savings, an attractive offering since the climb in fuel prices in the 1970s. A Boeing study in this area forecasts that the weight fraction of aluminum will decrease during the next decade from today's approximately 80 percent to 10 percent while the weight fraction of composite materials will increase from today's approximately 3 percent to 65 percent.

The aluminum industry is trying to ward off the threat to its position by developing new ultralight--but at the same time high-strength--alloys in which the lightest of all light metals is used to a much greater extent. As reported in the DFVLR NACHRICHTEN by Dr Ing Karl Welpmann and Prof Thomas Sanders, this entirely new class of alloys could find technical application as early as 1986. Preproduction test samples of the material have already been supplied to aircraft manufacturers.

Since lithium has a specific weight of just 0.5, its application as an alloying element for aluminum has frequently been considered. However, no useable alloys were achieved: Lithium is so highly reactive that its alloy melts attack the crucible material and can even explode under contact with water, even when the proportion of lithium is no higher than 2.5 to 3 percent. These difficulties were however overcome through new fusion and casting technologies developed by two firms in America and England.

Early on, the properties of this new class of alloys are being investigated in detail and standardized so they can be used in design. A study of the relations

between the material's microstructure and its mechanical properties, which is being carried out in the DFVLR Institute For Materials Research in Porz near Cologne, could lead to further improvements of the properties of these alloys. Presumably, the performance capabilities of these materials have not been fully exploited at this stage of development.

9160
CSO: 3698/621

PHILIPS RESEARCHES GALLIUM ARSENIDE USE FOR LASERS

Bern TECHNISCHE RUNDSCHAU in German 21 Aug 84 p 7

[Article: "Lasers: Light Sources with a Future"]

> [Excerpts] The field of applications for lasers continues to expand. A distinct synergy exists between laser research and the appearance of modern communications, filing, and entertainment systems in which tailored lasers play the central role. For glass-fiber communications, the long-wavelength laser is indispensable. The optoelectronic filing system with optical storage disks requires a somewhat shorter-wave laser with relatively high power which can burn the information into the disk in the form of troughs; required with this is also a laser with lower power which reads out the information.

Lasers are advancing not just in the professional sector but also quite clearly in the consumer area. Each application requires its own special type of laser. Philips Research is active in this broader field of laser applications. The objectives of this research are to mass produce lasers; to analyze the properties of materials which offer potentials for laser manufacturing; to optimize lasers; to acquire knowledge relating to life of laser materials and to develop associated technologies.

GaAs and AlGaAs

Chosen as a material for such lasers--depending on the desired laser-light wavelength--is gallium arsenide (GaAs), aluminum gallium arsenide (AlGaAs) or Indium gallium arsenide phosphide (InGaAsP).

The multilayer structure is usually produced using liquid-phase epitaxy (LPE) wherein a substrate (a crystal platelet on which the layers are to be grown) at high temperature is brought into contact with a melt which is saturated with the components to be deposited. Upon cooling, the compound crystallizes on the substrate. For lasers with relatively short wave lengths (780 to 900 nm), gallium arsenide is selected as a substrate. The growth of the multilayer structure (active layer and inclusion layer) takes place in a melt with gallium as a solvent and aluminum and arsenic as dissolved materials.

Among the applications of AlGaAs lasers fabricated in this fashion is the reading of compact disk . For longer wavelengths (1300 and 1550 nm), InGaAsP lasers are usually selected. The active layer consists of InGaAsP and the inclusion layers consist of InP. The usual field of application is glass-fiber communications. In optimizing the laser for a particular application, numerous alterations can be made in and on the layered structure. The result is a "tailored" laser. For the compact disk for example, lasers are desired that radiate photons which get somewhat out of step after travelling a few centimeters so that a reflected bundle does not interfere with the directly transmitted laser signal. Contrarily, for telecommunications applications, lasers are frequently required whose photons stay in phase even after travelling long distances.

Caption for Figure 6:

GaAs dualheterostructure laser on a copper block serving as a heat sink. The block was especially processed to have a smooth mounting surface and very sharp edges so that the laser crystal can be soldered over its entire mounting surface (good heat conduction) and in particular right to the edge of the block so that the laser bundle can exit above without disturbing reflections taking place at the edges of the block. Under the block is located a photodiode for measuring the light emitted on the backside of the laser so that the strength of the radiated laser light can be controlled.

9160
CSO: 3698/621

RIFA OF SWEDEN CONDUCTS RESEARCH IN III-V MATERIALS

Heidelberg ELEKTRONIK INDUSTRIE in German No 7/8, 1984 pp 70-71

[Article: "III-V Components From Sweden" prepared by Chief Editor Ing Heinz-Friedberg from information of Rifa AB, S-16381 Stockholm]

[Excerpts] Laser diodes, fast photo diodes and ultrafast logic for signal processing are indespensable components for optical communications systems. In order to be independent of commercially-available components in this futuristic area, the Swedish firm Rifa has established its own development program.

The 21st century is sometimes predicted to be the age of optoelectronics. Optical semiconductor components and ultrafast ICs of III-V compounds will then be used for telecommunications and high-speed signal processing. The nubmer of III-V components will probably be small in future systems also, but these few components will determine the properties of systems. And it will probably not be easy to get these components off the shelf.

The III-V Project at Rifa

In order to be prepared for this development, a development project for semiconductor components made from III-V compounds was undertaken in the spring of 1982 at Rifa AB, a subsidiary of Swedish Ericsson. As project manager Takashi Ishii, an experienced professional in microwave semiconductors, was brought to Sweden. The initial goal of the 8-man development team was the development of a GaAs FET for operation up to 12 GHz, a laser diode for CW operation at 950 nm and a fast photo diode for 1300 nm operation.

After successful completion of the initial development phase, prototype components with the following properties are available:

--GaAs field effect transistor

maximum frequency	f_{max} = 50 GHz
maximum amplification (12GHz)	MAG = 10 dB
minimum noise level (12GHz)	NF_{min} = 3 dB
amplification at NF_{min} (12GHz)	G_a = 8 dB

--GaAs/GaAlAs laser diode

wavelength	λ	= 850 nm
threshold current	I_{th}	= 90 mA
maximum radiation power	P_o	= 10 mW

--IP/InGaAsp PIN photo diode

dark current (U_R =20V)	I_D	= 15 nA
quantum efficiency (1.0...1.6μm)	Q	= 55 %
rise or decay time (1.0...1.6μm)	t_r	= 500 ps

The GaAs FET has a gate length of 1 m. With a further refined photo etching process and illumination by shortwave ultraviolet radiation, prototypes with even shorter gate lengths were recently produced.

The laser diode is a multimode type for short-range optical communication transmission. The emitting surface of 2...6μm^2 and a radiation divergence of 35...40 degrees permits simple coupling of glass fibers. A reaction time of 500 ps permits modulation frequencies up to about 1.5 GHz.

The PIN photo diode has excellent characteristics in the range 950...1,600 nm. An optimized band separation and a difference of only 0.1 percent in the lattice constants between the substrate and the epitaxial GaInAsP layer lead to the very low dark current. In a hermetically sealed microwave package the photo diode has a capacitance of $\leq$ 0.5 pF at -10 V.

Further Development Objectives

For reliable transmission of large quantities of information via optical fibers, wave lengths around 1,300 and 1,600 nm will be used. Such systems will undoubtedly be among the most important products of Swedish Ericcson. The market expectations for Rifa, which manufactures the components for optical communication transmission, are growing by the day. In consideration of these circumstances, the following objectives have been established for the III-V project:

--Very fast GaAs logic ICs with switching rates in the gigabit range,

--Optical transmitters and receivers for 1,300 and 1,600 nm with transfer rates into the GHz domain,

--Fast optical switches

In the case of laser diodes, development work was started last year on a monomode type made of InP/InGaAsP for 1,300 nm operation. The characteristics already achieved in the InP/InGaAsP photo diodes make these components well suited as optical receivers in glass fiber systems. Further development is focused on structural optimization for even higher data rates. Even before these products reach maturity, low-noise GaAs FETs with gate lengths of 0.5 and 0.25μm will be available for low-level signal amplification.

The combinations of very high speed components and optoelectronic components will finally lead to the integration of special monolithic optical and electronic functions.

Figure 1 caption:

In the initial phase of Rifa's III-V project, low-noise GaAs microwave FETs for operation up to about 12 GHz were realized.

Figure 2 caption:

Takashi Ishii directs the III-V project at Rifa. Involved in the research and development of semiconductor technologies and components since 1964, he possesses a wealth of knowledge and experience in this field. Before joining Rifa, he worked 8 years at Mitsubishi, serving as manager of the microwave-transistor group at the end of his tenure.

9160
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MICROELECTRONICS

NORTHERN TELECOM PLANT TO PRODUCE 'SMALLEST CHIPS' BY 1987

Montreal LE DEVOIR in French 26 Sep 84 p 13

[Article by Andre Bouthillier: "To Manufacture the Smallest Chips in the World by 1987, Northern Telecom Is Investing $80 Million in Its Nepean Plant"]

[Text] Northern Telecom wants to manufacture the smallest electronic chips in the world by mid-1987. To achieve this, its Northern Telecom Electric subsidiary will build a new plant next to its Nepean integrated-circuit facilities, in Ontario. The investment will amount to $80 million and will create 200 jobs.

This is the largest high-technology project to be created in the Ottawa area, the Canadian "Silicon Valley."

A subsidiary of Bell Canada Enterprises, Northern Telecom is hoping to design a new manufacturing process that could produce 1/4-inch chips containing 200,000 transistors. At present, the most sophisticated chips on the telecommunication equipment market will accept only 50,000 transistors.

The new process should make it possible to etch circuits on the chips with a microscopic precision of one micron, the equivalent of one millionth of one meter. The methods in use now are not as precise: they leave two to seven microns between transistors. As a comparison, the thickness of a hair is about 50 microns.

"No manufacturer has ever succeeded in producing such powerful chips, but many are trying," the president of Norther Telecom, Mr Edmund B. Fitzgerald, indicated at a press conference.

Northern Telecom must invest soon in the integrated-circuit (chips) sector in order to remain the leading world supplier of fully digital telecommunication systems.

Actually, the "chip market" in the data-processing and telecommunication sectors is growing at a frantic rate. The U.S. company Intel will devote $200 million this year to develop better chips. The electronic firms that do not have the most powerful chips will remain in the backyard of this industry.

The president of Northern Telecom Electric, Mr Charles G. Millar, explained that chips are the main factor in reducing the cost price of telecommunication systems, "as they make it possible to use extremely complex electronic circuits mounted on minute supports."

"The more complex the chip, the smaller the systems using it, and the lower their energy consumption," he added.

This is Northern Telecom's second largest investment in the Ottawa area. Two years ago, it had expanded the lab of its other subsidiary, Bell-Northern Research (1,300 people employed) at a cost of $37 million.

Northern Telecom's exclusive semiconductor components are designed by Bell-Northern Research and manufactured by Northern Telecom Electric (750 people employed). The company is responsible for the production of strategic electronic components used in the parent company's equipment. It 1984, it will have manufactured some 16 million chips of some 40 different models at its Nepean and San Diego plants.

9294
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THOMSON OF FRANCE TO PRODUCE MOTOROLA 32-BIT MICROPROCESSORS

Paris L'USINE NOUVELLE in French 27 Sep 84 p 29

[Article by Claude Amalric: "Thomson and Motorola: Union For the 32-Bit Microprocessors"]

> [Text] Thomson just gained access to the high-end microprocessor market, thanks to Motorola. But the technology will remain Thomson's.

The agreement just renewed by Motorola, the second largest manufacturer of integrated circuits in the world with expected 1984 sales of $1.6 billion, and Thomson is far more than a traditional second-source agreement. The present recovery of the French company, which was judged spectacular in the latest estimate of Dataquest, certainly contributed a lot to the agreement renewal (Thomson's semiconductor sales this year will amount to $320 million, i.e. 65 percent more than in 1983, and 56 percent come from integrated circuits...).

This agreement will enable Thomson to produce the Motorola 68020 32-bit microprocessor, giving Thomson's Grenoble engineers expertise of this level of complexity (200,000 transistors over not quite 1 cm^2). Especially since such a microprocessor implies a few peripheral circuits, which will have to be produced in addition to the 68020 microprocessor.

In 1978, Thomson had already acquired Motorola technology to manufacture the 6800 microprocessor which, together with the Intel microprocessor, became one of the two market standards, as did later on the 16-bit 68000 family.

But Thomson was also interested in selling some of its own circuits to Motorola, like the graphic processor developed by EFCIS [Special Integrated Circuit Study and Manufacturing Company] which is acknowledged to be among the best available on the market.

It is in this respect that the agreement renewed goes one step further. For Thomson, it means recognition of its efforts to modernize by a "major" company. For, if the agreement covers an exchange of designs, each of the manufacturers will have to implement its own technologies to comply with the specified performance figures. Motorola believed that Thomson could meet the challenge.

9294
CSO: 3698/21

BRIEFS

NEW THOMSON IC PLANT--In the Maxeville community, a suburb of Nancy, Thomson is going to build a research and manufacturing center to assemble and test integrated circuits. The first integrated circuits should be produced by the end of 1985. By the end of 1986, the personnel should consist of 468 people, including 120 engineers. This high-technology center will make it possible to repatriate activities now carried out in the Far East. [Text] [Paris L'USINE NOUVELLE in French 27 Sep 84 p 49] 9294

CSO: 3698/21

SCIENTIFIC AND INDUSTRIAL POLICY

EUROPE SEEN AS 'BIG LOSER' IN IBM CASE COMPROMISE

Rijswijk PT AKTUEEL in Dutch 15 Aug 84 p 5

/Article by Cees P. Ruigrok: "Politics vs Technology: Europe is the Big Loser"/

/Excerpts/ In recent weeks, reports have regularly appeared in the general and specialized press about the conflict between the European Commission and the computer giant IBM. The solution achieved is mainly presented as a compromise whereby, especially from the EC standpoint, the impression is created that the other party yielded to the Commission. The IBM position and especially the firm's strategy are further examined in this article. The efforts of the European Commission and also of the European computer industry are then compared and the result is not very positive for Europe.

The commissioner for competitive affairs, Frans Andriessen, may yet present the compromise achieved so positively: he hardly provides in it a view of the power of the computer industry and especially IBM. It is a problem with which many politicians are struggling, but obviously are not worried about. The dependency on American technology was only increased by the agreement between the EC and IBM. A spicy detail: the complaint about abusing its position (IBM) was made in 1977 by five American businesses, the European computer industry kept out of it and the European Commission heard a complaint which did not find any response in the USA.

IBM occupied about 40 percent of the European computer market valued at 12.6 billion dollars in 1983 and it became number two, Bull, only 7 percent. If you view the situation in the case of the big computers, then IBM even comes up with 65 percent and Siemens is the first European firm with a share of 7 percent, followed by Bull with 4 percent and ICL with 1 percent, a painful picture for the European computer industry, but certainly a fact.

IBM has 100,000 employees in Europe in 15 plants and 6 laboratories. A quarter of the turnover, over 10 billion dollars, was obtained in Europe and that is subject to a considerable tax payment. Even in our country IBM is one of the leading companies, its position on the computer market is extremely favorable, among others, with government, banks and insurance companies, but even with "ordinary" typewriters, the IBM brand still dominates.

The quality of the total product of an organization is not only the physical product, but depends to a considerable degree on the people in the organization. And IBM has realized that early like no other company. New workers are employed at a high level, commercial applicants, at a minimum, on the HBO /Secondary Education/ level, but preferably with a university education. The internal training could serve as a model for many universities. The center in Terhulpen (Belgium) may be simply called a European Harvard, but only for IBM interns. IBM has recognized like no other company that the level of its employees is decisive in the success of all operations; not for nothing have they promoted for a long time the slogan: "Think." And in this simple slogan, the whole philosophy of IBM is included, think and act in accordance with the findings; the agreement with the EC is a good example of that. Whoever has paid 4 billion guilders in taxes naturally can have some clout. And even the European Commission takes this into account. IBM's position in the European computer market is dominating, no single European computer producer is even able to somewhat match IBM's share on the national market--in spite of the protection existing, as a rule. Large government orders repeatedly go to the IBM in England and the FRG and even the European Commission itself uses large IBM computers. An earlier effort to obtain the necessary information supply with European computers failed miserably years ago. Moreover such efforts were often based on American technology, among others of Control Data. IBM is the organization of ladies and gentlemen with a nice appearance, with a good product and an outstanding organization working for decent prices. However, the guarantee is to be found in the three letters on the product.

What is a computer?

A computer is a dead apparatus, consisting of the most advanced technical inventions. The equipment speaks mostly to the imagination, chips have become a winged word. The slogan "software makes hardware happen" of the NSV /Netherlands Software Association/ indicates that all intelligent equipment must still be fed with programming. And with this, the most important point in the conflict with the EC is indicated, however the European

Commission gives the appearance that they have hardly any knowledge of matters on this subject. And the IBM knows everything about software, they know what the problems are and what the problems for others are. It almost appears that the EC negotiators should have first taken a course "Basic Principles of Computers."

For making information available about software after this is "reasonably stable" gives IBM every opportunity to first make the specifications available at a moment when there is no more danger. In this connection there is a quite different fact which the Andriessen team cannot foresee: a software system is of essential importance and on this point IBM has already prepared itself long ago. The EC's inability on this point is quite clear. There are no European computer companies which are a match for the competition.

When Andriessen declared in spite of his smile that competition for companies such as Philips and Siemens now becomes easy, he gives the appearance of a lack of understanding which cannot be considered possible for someone in such a position. Philips withdrew from this market years ago and Siemens delivers large Japanese produced computers! And Japanese Hitachi is convicted in the United States because of theft of important data from IBM. A conviction through which IBM can currently exercise control on all developments at the Japanese company. The software system is critically important here. The fact that the IBM chief, John Opel, indicates that IBM's method of doing business does not need to be substantially changed is characteristic: in the present computer systems, the software system is decisive for operation and there IBM dominates. The connection of the equipment, the so-called PCM's /Plug Compatible Machines/ will be a further concern for IBM; there is hardly a European producer of such equipment to be mentioned and moreover, the profits in a computer system are not in the input and output devices. In evaluating a computer system, it is a question in the first place of the control system and the additional software and only afterwards of the equipment. The conventional image of the computer has changed, the equipment is only a part and then not the most important part.

Conclusion

If a conclusion can be drawn from the agreement reached between the IBM and the EC, then the deficiency of the European computer industry is again confirmed. On the other hand, IBM's position dominating everything is emphasized, so the question may be asked whether this company is really American, but with its production centers, and especially research laboratories must be

considered European. The IBM is abundantly represented in all EEC countries, in the Netherlands, certainly very strikingly with the large typewriter plant in Amsterdam--IBM's largest outside the United States--and the famous software laboratory in Uithoorn. The production centers in countries such as the FRG, France and Italy are a model of advanced technology. And whoever walks through these plants meets very few Americans; on the contrary, for a so-called American company, there are certainly very many Europeans present. Therefore it is realistic to recognize IBM as a European business and viewed in that light, the EC action seems very strange. What European business employs 100,000 workers? What European industry shares 40 percent of the market.

What European industry has a social policy whereby no one is discharged?

Those are questions which in the I' case speak strongly in favor of the company; the European commissioner Andriessen has obviously thought otherwise about this. Whoever views the whole matter objectively can observe that a similar charge in the United States has meant over 13 years of legal work for IBM, now only 7 years have been involved in it and that costs a considerable amount. In the United States, the Department of Justice had to withdraw the charge, in Europe they were very pleased when the European Commission reported a so-called victory. Undoubtedly the IBM's commercial associates will now come to all authorities with the recourse that one act in accordance with European guidelines and get the necessary revenues out of that. The operating method of Andriessen and his team of officials and especially the arrogant presentation of the "victory" will be a subject for marketing experts in many courses for the section; "How not to do it." Once again it is herewith indicated that the European Commission suffers from a lack of experts in the field of modern technology. The immense bureaucracy does not understand one iota of the real problems; it would be a good thing if they would consult the real experts. The branch associations can no doubt give a suitable answer to the many questions which can be asked in the case of the so-called agreement between the EC and the IBM.

The computer user, and who is not, may wonder what they are up to now and especially what he or she will be affected by in day to day life. Clarity in the operation of the computer is more important for many than the EC's problem. As a conclusion, we can point out that the user has already made the choice a long time ago, especially through the act of purchase.

And among the users, we can count many government agencies, both in our country as well as abroad. IBM still remains the largest supplier; Andriessen cannot change anything about that and in view of Andriessen's position, quite rightly.

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SCIENTIFIC AND INDUSTRIAL POLICY

EUROPEAN ELECTRONICS, DP PATENTS FILED IN 1983

Paris INDUSTRIES ET TECHNIQUES in French 1 Sep 84 p 23

[Article signed C.V.: "Electronics and Data-Processing Patents: France Is Holding Up Its Head"]

> [Text] On European territory, the United States and Japan remain the leaders. But France, which fell behind during the first half of 1983, is now catching up.

With 2,953 electronics and data-processing European patent applications filed during the second half of 1983, compared with 2,892 during the first half, i.e. an increase of hardly 2 percent, the sector is characterized by a marked stabilization. Especially if we compare these figures with the formidable progress (+ 18 percent) achieved between the two previous half-years. This overall stability, however, covers very uneven variations: a 20-percent drop of activity for Germany, a 7-percent drop for the United States, but a marked recovery for France (+ 16 percent), and some progress for Japan (+ 5 percent)...

All the same, despite a decline in their activity, the United States are still leading the game with 32.5 percent of all applications, followed by Japan with 26.5 percent. Behind these two leaders, the gap is widening between France (17 percent) and Germany (9.5 percent). We should also mention that, in these statistics published by the French Patent Office, the figures for France are overestimated since they include European patents and patents for France alone. The leading company is IBM, with 7 percent of all patents, but the next two places are for Europe with Thomson (France, 5.6 percent) and Philips (Netherlands, 4.6 percent). On the other hand, Siemens (FRG), which ranked third for the first half of 1983, is now outdistanced by Toky Shibaura Denki (4.3 percent) and Sony (3.8 percent) (Japan).

The basic electronic circuit and semiconductor sectors (28 percent of all patents) show a 5-percent drop of activity. In these sectors, IBM remains the leading applicant, but we should note the strong representation of Japan, with 25 percent of all applications, with 4 Japanese companies (Tokyo Shibaura Denki, Fujitsu, Hitachi and Nec Corp.) among the 8 leading applicants. The technologies most frequently involved have to do with details of semiconductor devices and angle modulators.

This sector has been caught up with by consumer electronics (also 28 percent) whose activities progressed by 13 percent. With 7.4 percent of all applications, Philips follows closely behind the Japanese leader, Sony (9.4 percent). The favorite objects of the patents published are recording and reproduction through optical means and magnetization, as well as control and regulation devices, or tape-speed indicators.

As far as computers and computer components are concerned, the United States display a record activity, with 42 percent of all patents. In France, Thomson stepped up its activity and rose from 3 to 13 patents. Remote input/output terminals, error-correction devices, transistorized digital memory and numerical controls for machine tools are four of the technologies most often researched.

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SCIENTIFIC AND INDUSTRIAL POLICY

FRENCH MINISTER CURIEN TO SPARK NEW PROGRAMS, FUNDING

Paris L'USINE NOUVELLE in French 13 Sep 84 pp 54-57

[Interview with Research and Technology Minister Hubert Curien by Pierre Virolleau and Marc Chabrieui: 'Hubert Curien: The New Order of priorities']

> [Text] His inborn niceness and the careful way he weighs his every statement mustn't take you off-guard. As he has already demonstrated as president of the National Space Studies Institute, the new Research and Technology minister is skilled at putting his diplomatic talents to work on behalf of his ambitious goals. While the research community is slated for a pause in structural reforms, the minister has every intention of pushing ahead with some touchy realignments. Hubert Curien's motto might well be: "concentrate and bore in." Shift the focus of research agencies onto more clearly defined goals, orient programs toward selected priorities, put together the teams and their equipment at the European level. Nor has the minister forgotten industrial research, in which he plans to involve not government money, but private investment and university talent.

[Question] Just how do you plan to encourage industrial research?

[Answer] Expanding industrial research is an extremely important point for the Research and Technology Ministry. Despite a special effort made by the major nationalized companies, whose spending on R & D grew by more than 8 percent last year, that level is still clearly not enough for France. I'm not talking about quality, but about volume. Research conducted by corporations amounts to less than 60 percent of the overall national effort, as compared with 70 percent in the United States and Federal Germany. The same applies to industry's self-financing: 43 percent of R & D in France, as against 48 percent in the United States, 55 percent in Federal Germany, and 59 percent in Japan. Given these conditons, clearly

we have to do a lot more by way of research in the corporate, industrial setting.

Industry must not just sit back and wait for the government to go on handing out ever-fatter subsidies to it for research. The companies will have to do more themselves, and turn either to their stockholders' equity or to outside financing. In addition, we must provide them with incentives and, of course, reasonable subsidies, but primarily through steps having to do with credit, with loans... There are already several channels for assistance in place. They will be retained. This applies to the research tax credit which, in the first fiscal year in which it was effective, allowed a total of 600 million francs and was a resounding success. The same may be said of loans from the Research Implementation Agency (ANVAR) and Industrial Modernization Fund (FIM), which has won high marks for its alacrity in responding to applications.

Aside from this, we must start tapping new money and channeling it into research. In the United States, many investors are putting their money into founding new companies. Why not in France? I am currently considering measures that should facilitate that approach. For example, we could set up systems that would attract "venture capital investment pools." We might also contemplate improving direct financing of research and development out of savings and, more specifically, out of corporate innovations. All of that, though, will have to be determined in a broader context and undertaken in concert with the companies and with the lending agencies, with all sides making their contribution to a daring and ambitious policy.

[Question] Aside from financing, are you considering other areas of action?

[Answer] More young scientists must launch their careers in industry. We need, for example, to increase the number of theses written in the industry environment. They must be realistic, and prepared under the watchful eye of university professors, and thereby they will facilitate frequent short-term transfers between public and private laboratories. If they stick to subjects that fit in perfectly with the problems facing companies and if the companies are not required to lay out too much money for them, both partners will perforce reach agreement.

I am in fact convinced that you cannot move science and research development into industry by issuing government decrees. You have to adopt a steady, patient attitude, talk with the industry people, and win them over. The appointment 2 years ago of scientists to the boards of directors of the major corporations was a first step in that direction. We have to keep working on this until there is at least one scientist on the board of directors of most companies.

[Question] What about little companies?

[Answer] Expanding research and encouraging innovation among the small and medium companies (PMIs) is largely ANVAR's responsibility. We must also take steps to see that, out in the regions, the small businesses have a clearer picture of what is afoot. We are going to make things simpler for them. A single form, covering both administrative and financial matters, will be offered them, no matter what kind of research assistance they are seeking. Their application will be fired off to the proper agency. The decision will be made and will go into effect within the next few days.

[Question] Are you, for your part, considering some organizational changes in the technical centers?

[Answer] The professional research centers are not a homogeneous whole, although they do, all of them, do a good job of meeting the needs of their professions. Some of them are oriented primarily toward new processes. The others are almost exclusively concerned with training. Since there is no such thing as a standard center, it is practically impossible to deal with the problem through legislation. We must approach the problem on a case-by-case basis. Given these conditions, we cannot expect to see the sweeping reform we have been hearing about for the past 10 -- make that 15 -- years any time soon.

These centers must not lead us to forget the other industrial research and technology transfer structures. As one example, we have the contract research centers which are involved in many technologies. We might, also, ask ourselves if it might not be better to create new companies of this type, like Bertin, whose range of experience and competence is broad, or, on the contrary, encourage small, high-tech companies like Metraviv, which are more narrowly specialized and easier to set up. Among other features, our embryonic inventors could have access to total or partial funding for a number of years, with a guarantee of getting their jobs back from their original employers. Of course, this would require real concerted effort, across the board, from all parties concerned.

[Question] The first orientation and planning Act will expire in 1985. Will there be another Act along the same lines?

[Answer] The Industry and Research Minister at the time, Laurent Fabius, assigned Jacques-Louis Lions, professor at the College de France, to conduct a study mission on this matter. We shall have his conclusions between now and October, and proposals will be submitted to the High Council on Research and Technology. There are still a lot of unanswered questions. Will the new proposals take the form of law? Probably so. Will it be an orientation bill, rather than a planning bill? That remains to be decided. In any case, it will be a much slimmer bill than the first one. A lot of the measures embodied in that Act have already been put in place.

We shall not go back over agency structures and we shall do our best to provide very quick answers to pending problems concerning the status of staff. It is time to take a breather insofar as reforms of a structural nature are concerned.

[Question] Will the new bill contain budget targets, as the first one did?

[Answer] The 1982 Act was very ambitious indeed in the percentage increases in research budgets it projected. I don't think there is much likelihood that any such hard-and-fast percentages will appear in another bill of this kind. I am not criticizing the numbers posted in 1982 -- after all, I was party to their elaboration, and my working group, set up by Jean-Pierre Chevenement, was the "father" of the 17.8-percent levels predicted for annual growth. This very ambitious provision turned out to be most useful, in the event. It provided the jump-start current to get the program going, even though the goal has yet to be reached. Even so, I do not think we will take the same approach this second time around. As I see it, there are two possible ways to go: a guideline bill with very little quantification, which would redefine the start-up programs and refocus the activities of the research agencies, and a planning Act along the lines of the military appropriations bills, defining very specifically what is to be done and what deadline is to be met. The advantage in this latter solution is that it is very protective from the budgetary point of view. However, that makes it a lot harder to change anything whatsoever. Besides, predicting what new satellites must be developed and what course-changes must be made in biotechnology 3 to 5 years in advance is no easy matter. As the prime minister pointed out, we are going to look at all these questions from a very broad angle, with all our partners, public and private, and with all the political parties. So we won't be holding holding "assizes" again; but those hearings did provide a forum for the most representative spokesmen for each of the schools of thought. We shall examine with them their experiences of the past few years and talk about what they would like the next few years to be like. I would add that this does not look too difficult: these people are all partners I know well, and they just may be more forthcoming in conversation with me than they would be with a "political" minister.

[Question] The mission the prime minister gave you was to organize the scientific jobs market. What are you going to do there?

[Answer] It seems more necessary than ever to work out a long-term policy for employment in science. The ups and downs in hiring research people over the past 15 years have brought us into a sorry situation. Furthermore, we cannot go on indefinitely adding to the numbers of research people, engineers, and technicians in the government laboratories. We have to reckon with two problems. First, we must take care not to discourage brilliant students who want to do research, and we can do that by hiring a reasonable

number of new research people each year. Then, after a few years, we will be seeing a considerable number of spots opening up via retirement, due to the massive hirings that took place at the Atomic Energy Commission (AEC) during the Fifties and, a little later, at the National Scientific Research Center (CNRS).

This means that we are working on a 10-to-15-year plan. When it is completed, it will have restored the age and grade balance in research to something like equilibrium, rather than the present anomaly-ridden situation, with different rules and procedures in each agency. If we are to succeed in this, we shall have to work simultaneously on hiring levels, so as to assure a steadier rate and provide incentives for resignations. One prime way to do this is to adjust the bureaucratic membrane to permit freer osmotic exchanges among the schools, research administration, private research, and government research. It is essential that mobility among the public research agencies and provate research laboratories be enhanced. Often, aspiring young research people living in the university atmosphere are not aware of the possibilities the companies can offer them. We must create communicating vessels, not drainage ditches: there is room for the best and brightest in the government laboratories as well as in those of industry.

[Question] How would you like to run the country's research?

[Answer] I should like to see people shedding the attitudes we had 10 years ago at the General Delegation for Scientific and Technical Research (DGRST). And I know whereof I speak, because I was one of its most ardent advocates. Today, though, France is not the same; neither is French industry. A very wide swathe of concerted action was headed by DGRST. Now, however, the research agencies have achieved greater independence, have shouldered more specific responsibilities, as has the CNRS in the field of engineering sciences. We no longer have so many gaps to plug as we did 10 years ago. Increasingly, the research agencies are finding motivation to take on responsibilities in the sectors where they feel called upon to do so. The ministry is no longer called upon to step in as proxies for them by means of miscellaneous funding. On the other side of that coin, the existence of a Research and Technology Ministry which sets and adjudicates the annual budgets for these agencies makes it possible to conduct a research policy worthy of the name, to inform each one of them of the government's priorities, and to check on their progress every now and then.

DGRST never had the authority to monitor these agencies. It had only an advisory role, and could voice opinions only if asked to do so by the prime minister. On the other hand. the state agencies were not nearly so sharply oriented toward applications. It follows, then, that the DGRST's duty was to use its own funds to fill the breach. That is how we came to rally concerted action to get

molecular biology research off the ground. Today, though, the Pasteur Institute, INSERM , and the CNRS together have taken over. Subjects which remain in grey areas between two agencies are fewer and fewer. From now on. research funds must go mainly to projects that concentrate on programs of the kind we call mobilizing programs. There will of course be some emergency funds to cope with dire need or to rescue agencies in one or another kind of desperate situation. The ministry's essential role, however, is to support these agencies and to lay down the broad guidelines for action, in concert with them, not, in any case, to replace them.

[Question] How will these mobilizing programs evolve?

[Answer] There are two kinds of mobilizing program: programs that are aimed at achieving social and cultural ends, such as aid to development in the Third World, jobs, and improving working conditions, teaching the French language... and then there are programs that deal with the spreading technologies: energy, biotechnology, or electronics. These two types of programs must be given different types of handling.

The socially and culturally oriented programs are relatively long-term projects. We check on their progress from time to time, but we must not expect any earth-shaking breakthroughs from them. Theirs are political statements made by the government. We want to keep French a scientific language, we want to assure our continuing presence in the developing countries, we want the jobs policy to be cognizant of and accept the consequences of advancing technologies.

The programs for spreading technologies need rigorous review. We are going to make sure that the investments that have been made in this area are earning their keep. Now, don't go conjuring up visions of orgies of self-criticism. There must, nevertheless, be some course-changes. Specifically, in the electronics program. Within the next few months, we plan to assemble all the principals in this program and find out where their priorities lie. The truth of the matter is that we cannot go galloping off down all the highways and byways at the same time and hope to win every heat. We are not rich enough to promote duplication of programs the state is already funding. The orientation program could boast, to its credit, that it concentrated effort on three major technological programs. What we need to do now is to sharpen and cull the electronics and energy programs. In biotechnology, we finally got started just a short time ago. We must continue with conviction, but I am not sure that we are ready, right now, to make a truly sound decision as to where we must specifically concentrate our efforts.

[Question]Do you contemplate starting other programs of this kind?

[Answer] There are two major areas we might profitably consider. One is "productique" (production engineering) that has attracted a lot of psychological and political attention. This would also be one way to approach the problems of the heavy machinery sector, which nobody so far has been able to get a really good grip on. In this connection, I was amazed by the lack of follow-up given to the remarkable report on the mechanical sciences released in 1980 by the Academy of Science. Another rewarding area for serious thinking is that of materials. The problem here is that this is a very broad area, and one made up of dauntingly disparate components.

There is no guarantee that we will find sufficient unity to insure a satisfactory overall level of synergy here. All of this will, of course, be carefully studied as we prepare the follow-up portion of the orientation and planning bill I mentioned just now.

[Question] Will there be major new programs and big teams involved?

[Answer] In space research, the future is clear. The French are determined to maintain a healthy flow of space programs in Europe. The goal is the capacity to deploy an orbiting space station by the end of the century, along with everything that calls for by way of delivery vehicles. We have already won approval for going ahead with the Ariane 5 launcher. It is equally important that we do not lag behind in the area of applications satellites: what good is a transport vehicle if you transport only other people's satellites?

Space science in Europe has already got a good start, and we have been well repaid for the handful of risks we took 10 years ago. It would be absurd, though, to say that the only problem facing us now is that of mass production! The Americans, like the Soviets, have clearly shown us that in space, applications and basic research must keep the same cadence as they move forward.

In aeronautics, too, the skies are fairly clear. The only reservation I would voice here is that -- provided, of course, that the market holds strong -- I think that the Airbus program must continue. I am fairly optimistic, too, about the long-range TA 11 project. As for the other major programs, the future is not quite so clear. The nuclear power-plant industry is currently doing some soul-searching. What we expect there is not revolution, but, eventually, a change of course.

In the area of oceanic science, the first objective would be, if I may say so, to find a sound and stable grounding. Hitherto, our programs have often fluctuated between two great centers of interest. One one side you have the "geologists," who are exploring the sea-bottom and the continental shelf, and on the other you have the "marine" experts, who seek to know more about and exploit the oceanic environment itself. This dichotomy makes it difficult to construct programs that are entirely consistent, but the recent merger of the National Center for Exploitation of the Oceans (CNEXO)

and the Scientific and Technical Institute for Fisheries (ISTP) with IFREMER is a step in the right direction. Still another avenue is to study the ocean as an essential factor in shaping climates through its exchanges with the atmosphere. Enormous progress is expected here, thanks to the Poseidon and ERS-I observation satellites, designed and developed in collaboration with the Americans and the European Space Agency, respectively.

To sum up, I do not foresee any very large new national research programs in the offing. On the other hand, I have a lot of faith in big European hardware. In a way, we prefer it even to French-built equipment: it costs the taxpayer less, it is more fully utilized, and hence more easily replaced. This is why European joint undertakings have become indispensable, even if they have to start small as bipartite or tripartite, or if they find it necessary to adopt a "variable geometry."

Two examples: the Franco-German cryogenic wind-tunnel and the ESRF synchrotron loop for generating X-ray and ultraviolet radiation, for which a site has yet to be selected.

[Question] What is the status of European cooperation now?

[Answer] France's presidency at the European Community during the first half of 1984 enabled us to establish some important milestones in European scientific collaboration. Next Monday, the gathering in Paris of the research ministers from all 21 members of the Council of Europe should provide the forum for arriving at a number of important decisions. One would be the establishment of European networks in such naturally allied sectors as neurobiology, polymer physics and chemistry, geology, and oceanography. They will bring together laboratories ready to cooperate in such ways as staff exchanges and, more important, exchange of access to standard equipment whose owners never use it clear 'round the clock. This way we can avoid wasteful redundancies and enhance the economically sounder practice of exploiting our complementarity. Even now, networks like the ones we are talking of are working on such questions as "brain and behavior" or "acquisition of a second language" (among emigrants), are in existence and performing to the general satisfaction.

Theoretically, the subjects selected will be a far cry from the problems of applications and production, to which competition is a barrier. However, we must not discard sectors like the computer sciences. We must not, in fact, turn a blind eye to this concept of competition, particularly for Europe's cutting-edge industries which can survive only within the consortium structure.

Take the case of the space industry in the United States. There, three companies share the satellite and telecommunications market. In Europe, we have at least five potential prime contractors. That means that we must proffer maximum encouragement to alliances like

those between Aerospatiale and MBB, or MATRA and British Aerospace, because two or three such powerhouses are amply sufficient to the Old Continent's needs. In fact, intra-European cooperation arrangements should be made easier among high-tech companies than among our traditional industries, often hidebound by long tradition.

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BRIEFS

RESEARCH PERSONNEL NEEDED IN FRG--The large government programs for support of new technologies are in danger of stalling out for lack of qualified research personnel. The president of the University of Erlangen-Neurnberg, Prof Dr Nikolaus Fiebiger, has consequently proposed a special fund for subsidizing training in the new technologies. Five percent of a program's funds would be made available for this purpose. Over the next few years, an additional DM 300 million will flow annually into research and development of new technologies. About 1,000 additional scientists will be needed for this work. Quite different than in the older disciplines, the new technologies such as information, manufacturing and genetic engineering and new materials are lacking the basic infrastructure for research and training. Fiebiger believes that the number of direct entrants from other disciplines is inadequate, and only relatively few of those studying remain in these majors after receiving a diploma and promote to the university. In the GERMAN UNIVERSITY JOURNAL (15-16/84), the president of Erlangen University thus recommends the earliest possible start for programs for training scientists concurrent with the large research subsidy programs. The goal is to bring the students to the diploma level in eight semesters and to promotion in an additional two years. [Text] [Duesseldorf VDI NACHRICHTEN in German 17 Aug 84 p 1] 9160

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